

Respiratory Quotient (RQ)

Energy source requires a certain amount of oxygen and produces a specific amount of CO₂. The ratio of the volume of CO₂ produced to the volume of oxygen consumed (CO₂/O₂) is called the *respiratory quotient* (RQ). The RQ provides qualitative information regarding the substance used in the oxidative process. For example, when 1 g of carbohydrate is oxidized, 0.75 liters of O₂ is consumed, and 0.75 liters of CO₂ is produced. Thus the RQ equals 1 (RQ = 0.75 / 0.75 = 1). The RQ for the oxidation of 1 g of fat is 0.70, and that for 1 g of protein is 0.80. Values of RQ between 1.0 and 0.7 represent various mixtures of the three chemical energy sources. The RQ of a subject on a normal mixed diet is about 0.85, and that of a rested person who has fasted (basal) is about 0.82.

For the RQ to be an accurate reflection of the chemical energy source used in the oxidative processes, steady metabolic and respiratory function must be established. If the volume of CO₂ expired increases as a result of hyperventilation, as occurs in exercise or metabolic acidosis, the RQ will increase above 1.0. During voluntary hypoventilation or metabolic alkalosis, in which CO₂ is retained in the body, the RQ may fall below 0.70. The RQ under these ventilatory conditions does not truly reflect the oxidative metabolism, but rather reflects changes in pulmonary function.